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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE TESLA, INC. SECURITIES LITIGATION	Case No. 3:18-cv-04865-EMC **PLAINTIFF'S OPPOSITION TO DEFENDANTS' MOTION *IN LIMINE* NO. 5 TO EXCLUDE THE OPINIONS OF STEVEN HESTON AND MICHAEL HARTZMARK'S OPINIONS THAT RELY UPON THEM**

I. INTRODUCTION

Professor Steven Heston is the preeminent scholar for option pricing theory and practice in the United States. Plaintiff retained Professor Heston to offer five opinions based on his observation and analysis of actual Tesla, Inc. stock option prices during the Class Period. *See* Ex. 368, ¶¶11-16. Four of those opinions are not challenged by Defendants. His final opinion, regarding a method for measuring the impact of misrepresentations by Elon Musk and Tesla during the Class Period on option prices is attacked as "junk" and Defendants seek to have it, as well as certain opinions from Plaintiff's other expert, Dr. Michael Hartzmark, excluded.

Defendants, however, have presented nothing that undermines the reliability of Professor Heston's or Dr. Hartzmark's opinions. Defendants have not presented any academic literature, empirical evidence, or a methodology of their own to prove that Professor Heston's methodology is unreliable, speculative, or less superior to another methodology. Indeed, Defendants' arguments show a fundamental misunderstanding (or willful misrepresentation) of Professor Heston's opinion and option pricing in general. Defendants show a similar degree of confusion about Dr. Hartzmark's application of Professor Heston's observations to calculate damages for Tesla stock and options. Professor Heston's analysis and methodology are premised on the Black-Scholes-Merton ("BSM") option pricing model, which has been widely accepted and used in academia and the financial industry since it was first published in 1973 and won the Nobel Prize for economics in 1997. Professor Heston used the BSM model and the actual market prices for Tesla stock options to isolate and quantify the implied volatility for Tesla stock options (an important element of option prices) in a way that removes non-fraud related factors resulting from noise in options market data. Dr. Hartzmark uses these adjusted levels of implied volatility to assist him in generating "but-for" prices for Tesla stock and options for the purposes of calculating out-of-pocket damages. Defendants do not challenge in their motion the calculations undertaken by Professor Heston and Dr. Hartzmark for over 99% of the Tesla stock options traded during the Class Period.

Instead, Defendants make a series of disingenuous or irrelevant attacks on Professor Heston and Dr. Hartzmark. First, they object that Professor Heston does not use "actual market prices" for Tesla stock options and derives implied volatility for all call and put options with the same maturity

(of which there are seventeen during the Class Period). Professor Heston's analysis, however, is based on actual market data (prices and bid-ask data) for Tesla options during the Class Period. Professor Heston then adjusts that market data to remove non-fraud related price impacts (relating to micro-structure effects present in option pricing data) just as non-firm specific and non-fraud related price impacts are removed from stock price data. The intent and effect are the same in both instances: isolate to the greatest practicable extent the price impacts that are related to the alleged fraud alone. Under Defendants' theory, non-firm specific price impacts should not be disaggregated from market stock prices when calculating damages, a position that is contrary to Ninth Circuit law as well as Defendants' position regarding damages for stock purchasers in this case. Similarly, the application of one implied volatility to value multiple option series with the same maturity is widely accepted in the finance industry and, indeed, Tesla itself does this when valuing options for its financial statements.

Defendants' complaint about the application of Professor Heston's measurements of the implied volatility for Tesla stock options by Dr. Hartzmark to calculate damages also misses the mark. Dr. Hartzmark uses Professor Heston's measurements to calculate an amount of inflation or deflation measured in dollars for every Tesla option traded during the Class Period. This amount of inflation or deflation is calculated daily. This is directly analogous to a ribbon of stock price inflation that is constructed and accepted by the Court in virtually every securities class action. Like a stock price inflation ribbon, the inflation or deflation amounts calculated for Tesla options by Dr. Hartzmark are subject to statutory limits such as the 90-day lookback provision in the Private Securities Litigation Reform Act. These adjustments, which again apply in just a tiny handful of cases, do not make the overall analysis by Professor Heston or Dr. Hartzmark unreliable.

Finally, Defendants complain that Professor Heston did not calculate or test his methodology against an "error rate" or conduct an event study for the implied volatility observed from Tesla stock option prices. Professor Heston measures the changes in implied volatility by applying the BSM pricing model. There is no "error rate" for these measurements. Defendants compare his measurements to the observed bid-ask spread for particular Tesla stock options but Professor Heston is explicitly trying to avoid non-fraud related noise in the data created by the bid-

ask spread. Defendants' proposed "error rate" is simply irrelevant to Professor Heston's analysis and Defendants have not identified any academic literature to the contrary. Defendants' naked assertion that either Professor Heston or Dr. Hartzmark should have conducted an event study for the impact on implied volatility for Tesla stock options is also unsupported. There is no basis in either law or academic literature for conducting such an event study. In addition, the detailed analysis by both Professor Heston and Dr. Hartzmark of the changes observed in the implied volatility for Tesla stock options during the Class Period and their relationship to the misrepresentations and other news about the going-private transaction is the functional equivalent of event study showing the cause and effect of news with implied volatility and Tesla option prices.

II. ARGUMENT

A. Professor Heston's Methodology is Reliable and Robust.

Defendants correctly concede that the BSM model is appropriate to use in valuing Tesla stock options. *In re Countrywide Fin. Corp. Sec. Litig.*, 273 F.R.D. 586, 618 (C.D. Cal. 2009)("the Black–Scholes pricing model [is] a widely accepted option pricing model."). Defendants challenge Professor Heston's use of the prices of forward at-the-money straddles ("ATM Straddles") as an appropriate manner to calculate the implied volatility for a portfolio of options that share the same expiry. Ex. 368, ¶¶15, 162-183; Ex. 369, ¶¶9, 28. An ATM Straddle price simply represents the total price of a portfolio of ATM-forward options for a particular maturity. Ex. 368, ¶81. To calculate the ATM Straddles, Professor Heston used the ***average of the actual historical CBOE quoted prices*** for the put and call options immediately above and below the market price of Tesla common stock. *Id.* at Appx. E; Ex. HH, 71:20-72:9; 204:22-205:3. Professor Heston explained the reason that he used the ATM-forward options is because ATM options have the most time value, tend to have the narrowest bid-ask spreads, the highest volume, the thickest market, the highest sensitivity to volatility, and their use can minimize the effects of widening bid-ask spreads, stale quotes, and time deviations. Ex. HH, 129:18-130:20; Ex. 368, ¶83. Thus, using ATM option quotes to create ATM Straddles prices then to calculate implied volatilities is reliable and robust method to calculate implied volatilities for a portfolio of options. Defendants do not argue otherwise. Based on academic literature on the BSM model, Professor Heston then converts the ATM

Straddle prices into an implied volatility using an accepted calculation. Ex. 368, ¶¶15, 82, 167-69; Ex. HH, 104:6-24. This implied volatility can be used to calculate option prices for all options sharing the same maturity and these option prices are effectively stripped of any impact resulting from non-fraud related noise in options market data such as unusually wide bid-ask spreads and stale quotes, and thus are more appropriate to use for the purposes of calculating damages. Ex. 368, ¶164; Ex. 375, ¶¶217-218; *see* Ex. HH, 128:9-130:20.

Thus, Defendants' argument that Professor Heston's did not use "actual market prices" is demonstrably false. *Compare* Motion, 3 *with* Ex. HH, 93:5-15. Defendants, however, contend that Professor Heston must use observed transaction prices for each of the 2,400 plus Tesla option series that transacted during the Class Period (*i.e.* use the observed implied volatility for each option series or the midpoint of the bid-ask spread).[1] This approach would create substantial amounts of noise and includes potentially unrecoverable amounts into the damages measurement under the tenets of *Dura Pharms., Inc. v. Broudo,* 544 U.S. 336 (2005) as a result of the large bid-ask spreads that existed for Tesla options during the Class Period. *See* Ex. 1, Appx. G (average bid-ask spreads up to $14.05); *see* Ex. HH, 250:15-18; Ex. 369, ¶39 & Figure 5. Defendants also complain that the recalculated prices found by Professor Heston are not observed in the market data. Stock prices adjusted for non-fraud or non-firm specific effects are also not observed in the market data yet they are routinely used for calculating damages and, indeed, are preferred. Similarly, the adjusted prices calculated by Professor Heston seeks to minimize the impact of the bid-ask spread and other market micro-structure features on damages by disaggregating them from the implied volatility used to calculate an option price. *See* Ex. 368, ¶¶163-64, 177-183; Ex. 369, ¶¶29, 39-41; Ex. HH, 128:9-130:20, 134:10-23.

Defendants also argue that the Professor Heston's calculations are "wrong" based on the results that Defendants calculated when they inputted their own choices of assumptions which simply led to different estimates (*i.e.* the examples in Professor Seru's report at paragraphs 25-26)

[1] Defendants also complain that Professor Heston measures one implied volatility for all options with the same maturity, yet this assumption is derived from the BSM model itself and, indeed, Tesla itself follows the same approach when valuing options for its financial statements. Ex. 369, ¶12; Ex. II, 60, 82-83; Ex. JJ, 27:19-28:6 (use of BSM "a pretty standard practice.").

and that Professor Heston failed to consider this "error rate". *See* Ex. 369, ¶¶28, 41-42; Ex. HH, 230:23-231:11. The proposition that Professor Heston is to calculate an error rate based on Defendants' unsupported assumptions and results is absurd. *See* Ex. 369, ¶42. A calculation of an error rate requires a baseline (which are not Professor Seru's calculations based on an unsupported method) and Professor Heston has otherwise confirmed his results. *See* Ex. HH, 171:3-177:11, 179:10-181:18; 184:5-22. Here, Professor Heston has met his burden and the factor is inapplicable. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999) ("*Daubert's* list of specific factors neither necessarily nor exclusively applies to all experts or in every case").[2]

B. Dr. Hartzmark Reliably Measures the Impact of Musk's Tweets on Stock Options.

Dr. Hartzmark uses Professor Heston's calculation of adjusted implied volatility to calculate "but-for" prices of every Tesla stock option also using the "but-for" prices for Tesla common stock that Dr. Hartzmark also determines. This but-for price for each stock option is then subtracted from the actual transacted price of every stock option transaction to calculate an amount of price inflation or deflation. This figure will be used to calculate class damages for option investors. This is a direct application of the out-of-pocket methodology and the use of Professor Heston's adjusted figures for implied volatility minimizes any impact on damages from non-fraud related elements present in option pricing data. *See Baker v. SeaWorld Ent.*, Inc., No. 14CV2129-MMA (AGS), 2017 WL 5885542, at *14 (S.D. Cal. Nov. 29, 2017) (noting that "the standard formula for assessing damages" using the out-of-pocket methodology "is the artificial inflation per share at the time of purchase, less the artificial inflation at the time of sale"). Nevertheless, Defendants' claim that Dr. Hartzmark's calculations of damages overstate an investor's losses in over 100 instances. Motion, 4. This assumes that the mid-point of the bid-ask spread is the

[2] Defendants' "bounds" arguments are further misplaced as they place too much weight on Professor Heston's graphs in Section 4.3 of his Supplemental Report. These graphs use Professor Seru's "bid/ask bounds" (which are not created or adopted by Professor Heston) and were simply meant to demonstrate that even using Professor Seru's unsubstantiated assumptions and different modeling, that his results were both qualitatively and quantitatively similar to the Professor Heston. *See, e.g.,* Ex. 369, ¶¶36-42. Specifically, the bid-ask bounds shown in his Supplemental Report are not proffered to show the correctness of his methodology, but instead are a sensitivity analysis to show that Professor Heston's results are very similar to Professors Seru's results despite all the deficiencies in the Seru methods, including his failure to address the variation in bid-ask spreads in Tesla options. *See e.g.,* Ex. HH, 223:1-225:12.

appropriate price to begin their measurement, an assertion for which Defendants and their expert offer no justification. Temporarily setting aside Defendants' flawed reliance on mid-point prices, the 105 options account for less than ***1%*** of trading volume in dollar terms during the Class Period or less than ***0.5%*** of class-wide trading volume in dollar terms. In this Circuit, "[d]amages need not be proved to a mathematical certainty" and all that is required is that "sufficient facts must be introduced so that a court can arrive at an intelligent estimate without speculation or conjecture."[3] *Harmsen v. Smith,* 693 F.2d 932, 945 (9th Cir. 1982); *RRW Legacy Mgmt. Grp., Inc. v. Walker*, 751 F. App'x 993, 997 (9th Cir. 2018) (accord). Professor Heston's methodology as applied by Dr. Hartzmark reliably and reasonably calculates the harm attributable to the alleged fraud. Defendants have not presented their own model to prove otherwise.[4]

Dr. Hartzmark was explicit that his damages methodology will account for any such legal limitations. Ex. 375, ¶208 n.302 (noting that if the Court finds that the law limits damages only to the investment loss such limitation would be applied). Thus, Defendants' purported issues with Plaintiff's experts' opinions merely goes to the weight of the testimony and not its admissibility. *See Clear-View Techs., Inc. v. Rasnick*, No. 13-CV-02744-BLF, 2015 WL 3505003, at *2 (N.D. Cal. June 2, 2015) ("courts, in general, should avoid passing judgment on the 'factual underpinnings of the expert's analysis and the correctness of the expert's conclusions."); *In re Novatel Wireless Sec. Litig.*, No. 08CV1689 AJB (RBB), 2013 WL 12144150, at *11 (S.D. Cal. Oct. 25, 2013) (reasonable differences between methods of calculating damages goes to weight not admissibility); *see also Primiano v. Cook*, 598 F.3d 558, 564 (9th Cir. 2010) ("[s]haky but admissible evidence is to be attacked by cross examination, contrary evidence, and attention to the burden of proof, not exclusion.").

Defendants also attack the absence of an event study for implied volatility observed in Tesla's stock options. Defendants cite no authority that such an event study is required or even

[3] The 105 figure is also exaggerated. Of these option series, 31 have an ask price below the calculated artificial inflation and for which damages are less than the ask price. For these options, Dr. Hartzmark's artificial inflation estimate is realistic by Defendant's own benchmark.

[4] Defendants' citation to *In re Apple Inc. Sec. Litig.,* No. 4:19-CV-2033-YGR, 2022 WL 354785, at *13 (N.D. Cal. Feb. 4, 2022) is unavailing. If anything, *Apple* stands for the premise that impact quantum addresses the Court's predominance concerns as it provides a uniform methodology for calculating option prices using one implied volatility across a portfolio of options for an expiry.

feasible. Professor Heston, however, performed a comprehensive evaluation of the movements of Tesla option prices and reached conclusions, which are unchallenged, of the cause and effect of certain price movements of Tesla stock options and changes in implied volatility. *See, e.g.,* Ex. 368, ¶¶12-14, 114-161; Ex. HH, 270:13-274:2. Dr. Hartzmark concluded the same, found the movements in option prices and the implied volatilities resulted from the Musk tweets based on his and Professor Heston's analyses, and concluded that there was no evidence that anything material impacted the implied volatilities unrelated to the fraud. *See* Ex. KK, 30:22-31:1; 70:16-18; 105:9-107:2; 128:16-130:20; Ex. 375, ¶¶76, 186, 202, 206, 221; *see also* Ex. 1, ¶¶140-43 (event study analyses of option price reactions that traded pre- and post-Musk tweets on August 7 and 1,162 options pre- and post- *The New York Times* article which were the option series that contributed around 90% and 94%, of the Class Period volume, respectively); *id.* at Ex. XVI.[5] Thus, Plaintiff's experts have conducted an event study "or something similar" to support their opinions on Tesla stock option prices. *In re Imperial Credit Indus., Inc. Sec. Litig.*, 252 F. Supp. 2d 1005, 1015 (C.D. Cal. 2003). Defendants' arguments also fail because they have presented no evidence that option prices did not respond to the Musk tweets or that there were any market or industry movements, or statistically significant confounding information that affected the implied volatility of Tesla options.[6] In any event, "Defendants' criticisms that [plaintiff's expert] discounted the confounding information and exaggerated the impact of the alleged fraud go to his credibility and the weight of his opinions, not their admissibility." *See Smilovits v. First Solar, Inc.*, No. CV12-0555-PHX-DGC, 2019 WL 7282026, at *8 (D. Ariz. Dec. 27, 2019) at *9 (collecting cases); *see also SEC v. Leslie*, No. C 07-34442010, WL 2991038, at *15 (N.D. Cal. July 29, 2010).

III. CONCLUSION

For the foregoing reasons, Defendants' motion *in limine* should be denied.

[5] Defendants correctly note Dr. Hartzmark conducted an event study for the stock and that the underlying stock price – for which Dr. Hartzmark accounted for market/industry factors and potential firm-specific confounding news (*see, e.g.,* Ex. 375, ¶¶47-169) – is a critical component of an options price. Defendants' reference to the Fideres' article lends them no support as it not only mischaracterizes its content but also supports Dr. Hartzmark's opinions. *See* Ex. F (stating that underlying stock price is the "most relevant" to option prices and noting generally that "option pricing models can be adapted to the event study framework").

[6] Even accepting Defendants' arguments, in *arguendo*, the failure to account for confounding variables only goes to weight.

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Respectfully submitted,

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